



Tree Mortality: Facts and Figures

Tree Mortality Task Force

April, 2018

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Background

The Tree Mortality Task Force (TMTF) is comprised of state and federal agencies, local governments, utilities, and various stakeholders that coordinate emergency protective actions, and monitor conditions to address large areas of tree mortality resulting from six years of drought and associated bark beetle activity in California.

Numbers summarized below were generated by the TMTF Mapping and Monitoring Working Group to provide current estimates of mortality and high hazard zones to support taskforce leadership and address a variety of information requests from public and private entities. The mortality data is based on the U.S. Forest Service Aerial Detection Survey (ADS) flown on all forested areas of the State each year. This document is a revision of the March 2017 publication and uses ADS data from 2010-2017. This document is current as of April 2018. Values from 2010 through 2017 depict broad mortality trends and those from 2012 through 2017 are specific to the period described in the Governor's Proclamation of a State of Emergency on October 30, 2015 (CA 2015).

The primary focus of this document is the 10 high priority counties identified by the TMTF as suffering severe mortality. Analogous to the high priority counties, the U.S. Forest Service has identified six National Forests that are high priorities due to their elevated mortality (see Figure 1). Citations for data sources used in this report are found in Appendix A. Summaries for other counties can be found in the [USDA Interim Report](#) (USDA 2017b).

Tree Mortality Task Force Baseline Numbers

Description	Estimate
Estimated Number of Dead Trees in California: 2010 –2017	129 million trees
Estimated Number of Dead Trees in *High Priority Counties of California 2010 -2017	96 million trees
Estimated Number of Dead Trees on National Forests of the Sierra (Eldorado, Sequoia, Sierra, Stanislaus, Tahoe National Forests and LTBMU): 2010 –2017	66 million trees
Estimated Number of Dead Trees in Tier 1 **High Hazard Zones by Ownership <i>Statewide</i> : 2012-2017 (numbers rounded)	USFS: 7.0 million Other Federal: 1.4 million Private, State, Local: 8.8 million Total: 17.3 million
Estimated Number of Dead Trees in Tier 1 High Hazard Zones by Ownership <i>High Priority Counties</i> : 2012-2017	USFS: 6.0 million Other Federal: 1.3 million Private, State, Local: 7.4 million Total: 14.7 million
Acres of Tree Mortality in High Priority Counties: 2010 – 2017	3.9 million acres
Acres of Tree Morality detected in 6 Southern Sierra National Forests: 2010 - 2017	2.4 million acres
Estimated Acres of Tree Mortality in California by Ownership	USFS 5,358,000 Other Federal: 833,000 Private, State, Local: 2,638,000 Total: 8,829,000
Statewide Acres of Tier1 High Hazard Zones for Tree Mortality by Ownership	USFS: 377,511 Other Federal: 63,799 Private, State, Local: 669,223 Total: 1,110,500
Statewide Total Acres of Tier 1 and Tier 2 High Hazard Zones	Tier 1 Total: 1,110,500 Tier 2 Total: 22,075,200
High Priority Counties Total Acres of Tier 1 and Tier 2 HHZ	Tier 1 Total: 577,200 Tier 2 Total: 6,673,200
Estimated Acres of Forest Land in California based on U.S. Forest Service ***Forest Inventory and Analysis (FIA) Data	31.9 million acres
Estimated Number of Live Trees over 5-Inch Diameter Breast Height (DBH) on Forest Lands in California	4.1 billion trees
Estimated Number of Trees in Urban Areas of California	173.2 million trees
<p>*High Priority Counties were identified by the Tree Mortality Taskforce as most in need of assistance in addressing tree mortality issues and include Amador, Calaveras, El Dorado, Fresno, Kern, Madera, Mariposa, Placer, Tulare, Tuolumne.</p> <p>**High Hazard Zones are areas designated by California State government as being in greatest need of dead tree removal due to severe tree mortality levels caused by 5 years of Drought and subsequent bark beetle infestations. These areas are represented in two tiers, representing both potential direct threat to people, buildings and infrastructure from falling trees (Tier One), as well as broader fire risk and forest health considerations (Tier Two). See definitions in Section 1 below.</p> <p>*** Forest Inventory and Analysis (FIA) data are a statically based forest inventory maintained by the USDA Forest Service on a 10-year cycle.</p>	

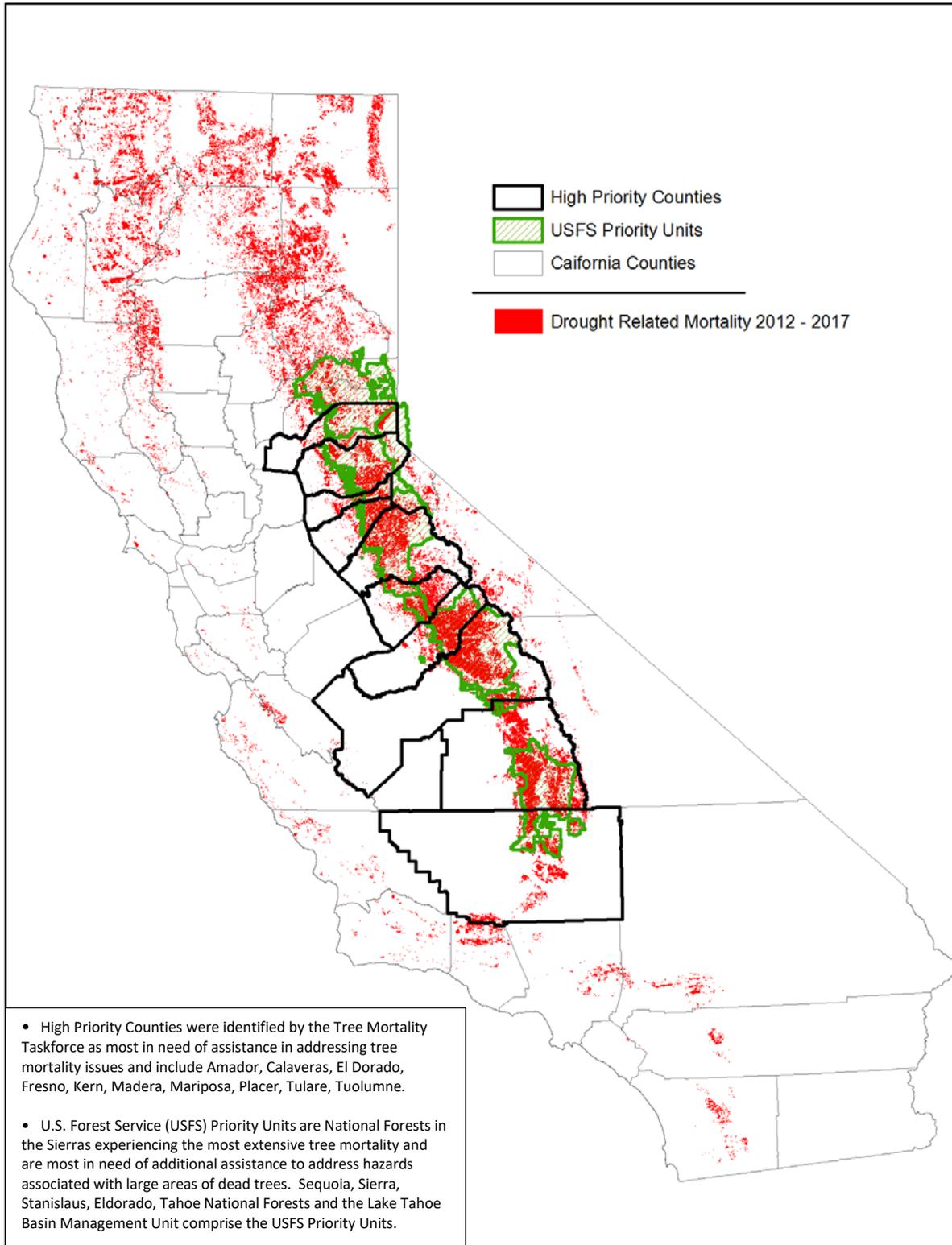


Figure 1: Aerial Detection Survey Coverage and Reporting Units

Section 1: Estimates of Dead Trees in California

Number of Dead Trees in California

Description: Between 2010 and late 2015, U.S. Forest Service Aerial Detection Surveys (U.S. Forest Service ADS) found that 40 million trees had died across California – with nearly three quarters of that total succumbing to drought and insect mortality from September 2014 to October 2015 alone. Surveys completed during the 2016 flight season resulted in detection of approximately 62 million additional dead trees. Surveys completed during the 2017 flight season showed a slowed mortality rate with 27 million dead trees, most likely due to the increase in precipitation during the 2016-2017 water year.

These estimates reflect dead trees killed by a variety of agents and are not limited to drought or drought related insect activity. Due to reporting conventions, the years covered go back two years prior to the start of the drought.

Data Date Range: 2010 through 2017

Assumptions: U.S. Forest Service Aerial Detection Survey results provide estimates of new dead trees over the period of interest. Survey results provide a reasonable estimate of dead trees that aid in the understanding of this mortality event.

Source: [USDA Interim Report](#) (USDA 2017b); USFS ADS GIS data (USDA 2010, 2015, 2016a, 2017).

Table 1a: Estimated Cumulative Number of Dead Trees in California: 2010 –2017

Time Period	Estimated Number of Dead Trees
2010	3.1 million
2011	1.6 million
2012	1.8 million
2013	1.3 million
2014	3.2 million
2015	29 million
2016	62 million
2017	27 million
Total	129 million

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Table 1b: Estimated Cumulative Number of Dead Trees in High Priority Counties of California: 2010 –2017

County	Estimated Cumulative Number of Dead Trees High Priority Counties <i>Totals Rounded to the nearest 1000</i>								
	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Amador	7,000	2,000	600	2,000	17,000	79,000	682,000	276,000	1,065,600
Calaveras	8,000	2,000	2,000	4,000	144,000	237,000	1,875,000	1,016,000	3,288,000
El Dorado	53,000	19,000	5,000	11,000	47,000	200,000	1,359,000	1,371,000	3,065,000
Fresno	82,000	59,000	82,000	65,000	269,000	4,300,000	11,912,000	4,385,000	21,154,000
Kern	79,000	18,000	8,000	23,000	176,000	3,300,000	2,994,000	387,000	6,985,000
Madera	15,000	8,000	6,000	31,000	55,000	1,900,000	8,972,000	3,327,000	14,314,000
Mariposa	18,000	10,000	21,000	72,000	68,000	1,200,000	6,562,000	1,497,000	9,448,000
Placer	90,000	16,000	5,000	5,000	21,000	80,000	557,000	709,000	1,483,000
Tulare	234,000	46,000	57,000	67,000	272,000	6,800,000	12,957,000	4,808,000	25,241,000
Tuolumne	39,000	15,000	45,000	83,000	287,000	997,000	6,213,000	2,721,000	10,400,000
Total	625,000	195,000	231,600	363,000	1,356,000	19,093,000	54,083,000	20,497,000	96,443,600

Table 1c: Estimated Cumulative Number of Dead Trees on Select National Forests of the Sierra: 2010 –2017

National Forest	Estimated Cumulative Number of Dead Trees on Select National Forests <i>Rounded to the nearest 1000</i>								
	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Eldorado	78,000	21,000	5,000	7,000	62,000	210,000	1,028,000	1,251,000	2,662,000
LTBMU	15,000	6,000	1,000	1,000	6,000	35,000	72,000	168,000	304,000
Sequoia	191,000	33,000	63,000	89,000	323,000	6,130,000	10,147,000	3,480,000	20,456,000
Sierra	82,000	66,000	72,000	103,000	190,000	5,900,000	18,563,000	6,836,000	31,812,000
Stanislaus	49,000	15,000	55,000	81,000	414,000	1,251,000	4,896,000	2,240,000	9,001,000
Tahoe	165,000	42,000	21,000	9,000	30,000	93,000	358,000	641,000	1,359,000
Total	580,000	183,000	217,000	290,000	1,025,000	13,619,000	35,064,000	14,616,000	65,594,000

Number of Dead Trees in Tier 1 High Hazard Zones

Description: Tier 1 High Hazard Zones (HHZ) are areas where tree mortality, caused by drought, coincides with critical infrastructure, including but not limited to roads, utilities, and public schools. HHZs represent a direct threat to public safety and identify areas to be prioritized for hazardous tree removal. These zones are identified pursuant to the Governor’s State of Emergency Executive Order in 2015. The number of dead trees reported below were generated based on U.S. Forest Service ADS results from 2012 through 2017. Information on Local Tier 1 High Hazard Zone designations are provided upon request. Estimates of dead trees for all other counties can be found in the [USDA Interim Report](#) (USDA 2017b). *These estimates reflect trees killed by drought and drought related insect activity only.*

Data Date Range: 2012 through 2017

Assumptions: The primary assumption for this metric is that dead trees are evenly distributed across mapped areas. U.S. Forest Service ADS data for 2012-2017 are statewide. U.S. Forest Service ADS results are estimates of trees that died over the period of interest. Survey results are a reasonable estimate of dead trees that aid in the understanding of this mortality event. High Hazard Zones are generated from drought related mortality data and cover the drought years of 2012 to the present. Ownership GIS data used is a reasonable representation of each entity’s land holdings.

Source: Tier 1 HHZ GIS data (CA 2018), U.S. Forest Service ADS (USDA 2010, 2015, 2016a, 2017) and CPAD (2017a) GIS data.

Table 1d: Statewide Estimated Number of Dead Trees in Tier 1 High Hazard Zones by Ownership: 2012 – 2017

Estimated Number of Dead Trees by Ownership Rounded to the Nearest 1,000					
USFS	Other Federal	Private	State	Local	Total
7,047,000	1,394,000	8,593,000	168,000	68,000	17,270,000

Table 1e: Priority Counties Estimated Number of Dead Trees in Tier 1 High Hazard Zones by Ownership: 2012 – 2017

High Priority Counties	Estimated Number of Dead Trees by Ownership Rounded to the Nearest 1,000			
	USFS	Other Federal	Private, State, and Local	All
Amador	49,000	31,000	272,000	352,000
Calaveras	212,000	61,000	1,062,000	1,335,000
El Dorado	197,000	6,000	293,000	496,000
Fresno	2,192,000	21,000	1,394,000	3,607,000
Kern	276,000	37,000	532,000	845,000
Madera	822,000	7,000	629,000	1,458,000
Mariposa	524,000	535,000	1,116,000	2,175,000
Placer	114,000	7,000	214,000	335,000
Tulare	983,000	470,000	597,000	2,050,000
Tuolumne	606,000	108,000	1,263,000	1,977,000
Total	5,975,000	1,283,000	7,372,000	14,630,000

Section 2: Estimated Area of Tree Mortality

Area of Dead Trees in California

Description: Acres reported in this section represent the total area of observed tree mortality statewide, and in the 10 high priority counties and 6 National Forests of the Sierra based on U. S. Forest Service Aerial Detection Survey methods.

These estimates reflect areas of dead trees killed by a variety of agents and are not limited to drought or drought related insect activity. Due to reporting conventions, the years covered go back two years prior to the start of the drought. All overlap between surveys was removed prior to analysis.

Data Date Range: 2010 - 2017

Assumptions: Lands where mortality was mapped repeatedly through time are only counted once. Ownership GIS data used is a reasonable representation of each entities land holdings.

Source: U.S. Forest Service ADS (USDA 2010, 2015, 2016a, 2017) and CAPD (2017a) GIS data.

Table 2a: Cumulative Acres of Tree Mortality in High Priority Counties: 2010 –2017

County	Acres
Amador	88,000
Calaveras	178,000
El Dorado	381,000
Fresno	607,000
Kern	359,000
Madera	385,000
Mariposa	318,000
Placer	215,000
Tulare	831,000
Tuolumne	505,000
Total	3,867,000

Table 2b: Cumulative acres of tree mortality in National Forests of the Southern Sierra: 2010 –2017

National Forest	Acres
<i>Rounded to the nearest 1000</i>	
Eldorado	276,000
LTBMU	40,000
Sequoia	631,000
Sierra	760,000
Stanislaus	432,000
Tahoe	246,000
Total	2,385,000

Table 2c: Cumulative Acres of Tree Mortality Detected in California by Ownership: 2010- 2017

Ownership	Acres
<i>Rounded to the nearest 1000</i>	
U.S. Forest Service	5,358,000
Other Federal	833,000
Private, State and Local	2,638,000
Total	8,829,000

Section 3: High Hazard Zones

Acres of High Hazard Zones

Description: Acres reported below represent areas mapped as Tier 1 and Tier 2 High Hazard Zones (HHZ).

Tier 1 High Hazard Zones are areas where tree mortality, caused by drought, coincides with critical infrastructure, including but not limited to roads, utilities, and public schools. Tier 1 HHZs represent a direct threat to public safety and identify areas to be prioritized for hazardous tree removal. These zones are identified pursuant to the Governor’s State of Emergency Executive Order in 2015.

Tier 2 High Hazard Zones are areas defined by watersheds (HUC12, average 24,000 acres) that have significant tree mortality combined with community and natural resource assets. Work at the Tier 2 level addresses the immediate threat of falling trees and fire risk, and supports broader forest health and landscape level fire planning issues. They represent areas to be prioritized for hazard mitigation as well as forest health restoration. These zones are identified pursuant to the Governor’s State of Emergency Executive Order in 2015.

Ownership information is based on California Protected Areas Database (CPAD), updated in 2017. CPAD contains data on lands owned in fee by federal, state, and local governments as well as non-profits that are protected from development. Tier 2 HHZ for 2017 includes two locally designated watersheds. Information on the local designation processes are provided upon request. For acreages of HHZ in all counties, see Appendix B.

These estimates reflect trees killed by drought and drought related insect activity only. The period covers the years of the drought, 2012 through 2017.

Data Date Range: ADS data from 2012 – 2017, ownership data from 2017, watershed data from 2017.

Assumptions: Locations where Tier 1 and Tier 2 HHZ overlap are included in this summary. Ownership GIS data used is a reasonable representation of each entity’s land holdings.

Source: Tier 1 HHZ (CA 2018), Tier 2 HHZ (CA 2018), CPAD (2017a) and WBD (2017) GIS data.

Table 3a: Statewide Summary of Tier 1 and Tier 2 High Hazard Zones, 2017-2018

Year	Acres of Tier 1 HHZ Rounded to nearest 100	Acres of Tier 2 HHZ Rounded to nearest 100	Number of Tier 2 Watersheds*
2017	957,200	20,161,000	782
2018	1,110,500	22,075,200	859
Change	154,800	1,914,200	77

* HUC 12 watersheds (WBD 2017)

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Table 3b: Statewide Summary of Acres of Tier 1 and Tier 2 High Hazard Zones by Ownership, 2017-2018

Year	HHZ	USFS	Other Federal	Private	State	Local	Total*
2017	Tier 1	306,000	58,300	577,600	11,100	4,200	957,200
2018	Tier 1	377,500	63,800	645,100	15,800	8,300	1,110,500
Increase of Tier 1		71,500	5,500	67,549	4,700	4,100	153,300
2017	Tier 2	10,013,000	1,734,500	7,953,100	271,900	238,900	20,161,000
2018	Tier 2	11,021,600	1,937,600	8,446,100	299,800	370,500	22,075,200
Increase of Tier 2		1,008,600	203,100	493,000	27,900	131,500	1,914,200

*Rounded to the nearest 100

Table 3c: Priority Counties Acres of Tier 1 High Hazard Zones by Ownership, 2018

High Priority Counties	Acres of Tier 1 High Hazard Zones rounded to the nearest 100					
	USFS	Other Federal	Private	State	Local	Total
Amador	3,900	1,500	20,900	200	*	26,500
Calaveras	9,800	2,800	57,100	1,000	*	70,700
El Dorado	22,400	1,400	49,000	800	300	73,900
Fresno	38,200	1,200	27,400	100	200	67,100
Kern	16,200	2,200	27,400	100	700	46,600
Madera	17,400	400	29,600	100	*	47,500
Mariposa	12,900	16,200	34,800	100	300	64,300
Placer	13,500	1,100	26,500	3,100	1,200	45,400
Tulare	23,800	12,300	21,000	900	*	58,000
Tuolumne	26,000	3,800	46,200	800	400	77,200
Total	184,100	42,900	339,900	7,200	3,100	577,200

*Values were under 100 acres

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Table 3d: Priority Counties Acres of Tier 2 High Hazard Zones by Ownership, 2018

High Priority Counties	Acres of Tier 2 High Hazard Zones rounded to the nearest 100					
	USFS	Other Federal	Private	State	Local	Total
Amador	50,400	6,100	118,300	600	100	175,500
Calaveras	78,000	29,500	206,500	3,500	300	317,800
El Dorado	392,400	18,700	339,800	6,800	1,900	759,600
Fresno	724,400	77,300	141,200	1,200	2,400	946,500
Kern	249,300	135,700	561,600	16,400	23,600	986,600
Madera	354,800	54,500	258,600	500	700	669,100
Mariposa	111,300	149,100	184,100	200	1,600	446,300
Placer	311,900	35,800	227,900	9,400	14,700	599,700
Tulare	511,300	245,400	154,000	5,900	200	916,800
Tuolumne	491,800	135,300	221,900	4,600	1,700	855,300
Total	3,275,600	887,400	2,413,900	49,100	47,200	6,673,200

Section 4: Estimates of Live Trees in California

Acres of Forest Land in California

Description: Average area of forest land (lands dominated by hardwoods and conifer tree species) in California; excludes urban trees, orchards and windbreaks.

Data Date Range: 2007 - 2016

Assumptions: Lands dominated by hardwood and conifer tree species are considered forest lands in California. U.S. Forest Service Forest Inventory Analysis (FIA) data provides a reasonable approximation of forest land extent when data is averaged over a 10-year sampling period.

Source: FIA 2007 – 2016 Area Report for all California counties (USDA 2017a).

Table 4a: Estimated Acres of Forest Land in California based on FIA Data: 2007 - 2016

Vicinity	Estimated Forest Land Acres
California	31.9 million

Number of Live Trees Forest Land in California

Description: Average number of live trees in California forest land estimated from U.S. Forest Service Forest Inventory Analysis (FIA) data. Numbers reported below include all live trees (hardwoods and conifers) on public and private forest land over five-inch diameter at breast height (DBH). Lands characterized as urban, orchards and windbreaks are not included. For a more detailed summary of live trees by diameter class and species group see Appendix B.

Data Date Range: 2007 - 2016

Assumptions: By averaging annual plot data collected over the 10-year time period, U.S. Forest Service FIA data provides a reasonable estimate of live trees in the state. This timeframe was used because U.S. Forest Service FIA plots are re-read on a 10-year rotation. This date range provides the most recent baseline conditions for which data is available.

Source: U.S. Forest Service Forest Inventory and Analysis Program 2007-2016 Tree Count Reports for all California counties (USDA 2017a).

Table 4b: Estimated Number of Live Trees over 5-Inch DBH on California Forest Land: 2007 - 2016

Vicinity	Estimated Live Tree Count
California	4.1 billion

Estimated Number of Trees in Urban Areas

Description: The approximate number of trees in urban forests was estimated by the U.S. Forest Service Urban Ecosystems and Social Dynamics Program (McPherson et al., 2016). Urban areas are defined by the U.S. Census Bureau as densely developed areas that contain 50,000 or more inhabitants with a density level of 1,295 persons or greater per square kilometer. This study used tree data from field plots in urban areas to describe forest structure (e.g., tree numbers, density, basal area, species composition) for six land use categories in six California climate zones. Urban tree canopy was mapped at one-meter resolution. Tree numbers and standard errors were estimated as the product of tree densities and land areas for each land use type and climate zone. For a more detailed summary of the methods please refer to McPherson et al. (2016).

Data Date Range: 2012

Assumptions: Model assumptions and inputs are a reasonable way to approximate the number of trees in urban areas. The U.S. Census Bureau definition of urban areas is an adequate categorization of this land use type.

Source: McPherson, et al. 2016. Urban tree canopy cover map was classified by EarthDefine based on 2012 National Agricultural Imagery Program data for California.

Table 4c: Estimated Number of Trees in Urban Areas of California: 2012

Vicinity	Estimated Urban Tree Count
California	173.2 million trees

Appendix A: Reference Data Sources

This is a list of citations for data sources used to create this report.

California Protected Areas Database (CPAD). 2017a. [Ownership GIS Data](http://www.calands.org/data). GreenInfo Network, Ca. August 2017. Available online: <http://www.calands.org/data>.

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Watershed Boundary Dataset (WBD). 2017. Coordinated effort between the USDA-NRCS, USGS and EPA. WBD was created from a variety of sources from each state and aggregated into a standard national layer for use in strategic planning and accountability. Watershed Boundary Dataset for California. September 05, 2017. Available online: <https://nhd.usgs.gov/wbd.html>

Tree Mortality: Facts and Figures

Christensen, G.A.; Gray, A.N.; Kuegler, O.; Tase, N.A.; Rosenberg, M. 2017. AB 1504 California Forest Ecosystem and Harvested Wood Product Carbon Inventory: 2006 - 2015. Final Report. U.S. Forest Service agreement no. 14-FI-11052021-220 and California Department of Forestry and Fire Protection agreement no. 7CA02025. Sacramento, CA: California Department of Forestry and Fire Protection and California Board of Forestry and Fire Protection. 390 p.

Appendix B: Live Trees in California

U.S. Forest Inventory and Analysis Live Tree Report Number of Live Trees on California Forest Land

Description: Average number of live trees in California forest land estimated from U.S. Forest Inventory Analysis (FIA) data. Numbers reported below include all live trees (hardwoods and conifers) on public and private forest land over five-inch diameter at breast height (DBH). Lands characterized as urban, orchards and windbreaks are not included. For a more detailed summary of live trees by diameter class and species group see Table B1.

Data Date Range: 2007-2016

Assumptions: By averaging annual plot data collected over the 10-year time period, U.S. Forest Service FIA data provides a reasonable estimate live trees in the state. This timeframe was used because FIA plots are re-read 10-year rotation.

Source: U.S. Forest Service Forest Inventory and Analysis (FIA) Program 2007-2016 Tree Count Reports for all California counties (USDA 2017a).

See Table B1 on the following page.

Tree Mortality: Facts and Figures

Table B1: Number of Live Trees over 5 inch DBH on Forest Land in California by Species Group and Diameter Class (inches)*

Tree species groups	Diameter at Breast Height (DBH) Class										Total
	5.0-6.9 in	7.0-8.9 in	9-10.9 in	11-12.9 in	13-14.9 in	15-16.9 in	17-18.9 in	19-20.9 in	21-28.9 in	29+ in	
<i>Acres</i>											
Douglas-Fir	131,334,003	95,491,175	71,819,953	53,236,776	39,714,190	29,728,593	24,059,431	17,403,538	34,832,615	28,641,419	526,261,693
Ponderosa and Jeffrey Pines	101,682,255	81,578,673	65,332,059	50,427,923	36,754,197	27,740,696	21,903,510	16,012,390	32,281,778	16,190,066	449,903,547
True Fir	153,609,033	110,070,014	85,449,836	61,314,456	49,219,250	39,866,743	29,865,639	23,307,818	47,900,006	29,208,073	629,810,868
Western Hemlock	1,378,866	776,074	545,941	540,643	343,370	386,772	281,363	164,628	377,526	118,297	4,913,480
Sugar Pine	11,205,478	9,049,570	6,917,461	5,770,598	4,008,772	3,157,008	2,816,212	2,185,145	7,431,739	6,862,134	59,404,117
Western White Pine	6,113,491	3,839,442	2,947,803	1,970,505	1,385,362	1,180,898	1,264,097	799,636	1,919,510	2,500,633	23,921,377
Redwood	32,727,793	24,267,157	18,381,688	16,326,470	13,191,156	10,993,848	7,675,061	6,864,000	17,239,661	12,449,139	160,115,973
Sitka Spruce	638,728	710,651	246,158	191,550	318,435	251,232	329,330	191,550	750,111	301,788	3,929,533
Engelmann and other spruces	230,033	148,849	70,260	33,237	35,130	--	70,260	0	61,851	23,112	672,732
Western Larch	--	--	34,816	--	--	--	--	--	--	--	34,816
Incense-Cedar	66,381,572	42,361,653	30,964,075	20,451,650	13,156,929	10,606,573	7,699,275	6,283,067	12,439,774	7,645,452	217,990,020
Lodgepole Pine	36,367,623	23,446,035	20,422,213	14,789,755	12,715,416	8,666,833	7,455,023	6,523,125	12,762,379	4,174,816	147,323,218
Western Red Cedar	--	--	35,130	--	--	--	--	--	25,737	19,088	79,955
Woodland softwoods	19,810,476	16,954,871	14,160,394	11,036,726	9,691,339	7,168,285	5,841,211	3,118,809	4,975,327	1,164,559	93,921,997
Other western softwoods	55,249,533	42,173,185	29,466,887	18,849,266	14,448,415	10,807,437	9,524,243	6,964,697	11,989,515	5,415,636	204,888,814
Cottonwood and Aspen	3,812,435	1,480,294	736,694	693,446	473,947	582,949	298,801	308,901	589,739	122,878	9,100,084
Red Alder	5,909,330	5,360,994	4,366,791	4,224,647	1,937,042	1,351,475	845,284	277,032	343,072	42,628	24,658,295
Oak	355,138,315	231,733,502	141,353,492	81,437,854	49,808,167	31,158,807	21,753,907	12,830,520	19,566,482	4,717,436	949,498,482
Other western hardwoods	209,821,346	129,925,632	80,367,790	50,422,974	30,769,501	17,599,116	13,044,282	8,224,036	12,658,600	2,454,168	555,287,445
Woodland hardwoods	7,346,267	4,630,227	4,083,599	2,361,831	1,392,487	1,076,831	761,542	514,165	378,623	74,075	22,619,647
Total	1,198,756,577	823,997,996	577,703,043	394,080,305	279,363,105	202,324,095	155,488,471	111,973,059	218,524,047	122,125,397	4,084,336,095

*Numbers reported are limited to 5 inch DBH and larger trees to allow for comparison to ADS estimates. Values represent a 10-year average estimate from 2007 – 2016 plot data.

Appendix C: Forest Land in California

U.S. Forest Inventory and Analysis Area Report (Core Table 4)

Acres of Forest Land in California

Description: Average area of forest land (lands dominated by hardwoods and conifer tree species) in California; excludes urban trees, orchards and windbreaks.

Data Date Range: 2007-2016

Assumptions: Lands dominated by hardwood and conifer tree species are considered forestlands in California. U.S. Forest Service FIA data provides a reasonable approximation of forestland extent when data is averaged over a 10-year sampling period.

Source: U.S. Forest Service FIA 2007-2016 Area Report for all California counties (Christensen, 2017).

Note: Totals may be off due to rounding.

¹Timberland: capable of producing in excess of 20 cubic feet per acre per year of wood at culmination of mean annual increment.

²Other forest land: not capable of producing in excess of 20 cubic feet per acre per year of wood at culmination of mean annual increment.

Table C1: Area of Hardwood Forest Land by Forest Type Group, Ownership Group, and Forest Land Status^{1,2}, California 2007 – 2016 (Christensen, 2017)

Hardwood Forest Type Group	Ownership										
	U.S. Forest Service		Other federal		State & local government		Private corporate		Private non-corporate		All owners
	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Total
<i>Thousand Acres</i>											
Alder / Maple	27	16	12	28	--	7	87	1	34	17	229
Aspen / Birch	13	44	--	9	--	1	4	--	--	--	71
Elm / Ash / Cottonwood	--	5	--	1	--	8	--	3	--	15	32
Tanoak / Laurel	203	220	13	59	11	150	505	28	546	100	1,835
Western Oak	905	1,541	103	528	18	445	374	662	583	3,639	8,799
Woodland hardwoods	28	92	--	63	--	14	--	--	--	30	227
<i>Thousand Acres</i>											
Exotic hardwoods	--	--	2	--	--	--	--	--	--	3	5
Other hardwoods	130	82	11	29	4	40	57	3	90	95	540
Total	1,306	2,000	141	716	34	666	1,028	697	1,253	3,898	11,738

Tree Mortality: Facts and Figures

Table C2: Area of Softwood Forest Land by Forest Type Group, Ownership Group, and Forest Land Status^{1,2}, California 2007 – 2016 (Christensen, 2017)

Softwood Forest Type Group	Ownership										
	U.S. Forest Service		Other federal		State & local government		Private corporate		Private non-corporate		All owners
	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Total
<i>Thousand Acres</i>											
California mixed conifer	4,191	1,031	68	446	30	50	1,662	--	509	3	7,990
Douglas-Fir	157	174	19	51	24	30	342	--	336	--	1,133
Fir / Spruce / Mountain Hemlock	1,107	463	6	193	10	11	189	--	71	--	2,049
Western Hemlock / Sitka Spruce	--	--	--	1	1	1	28	--	7	--	39
Lodgepole Pine	228	485	--	233	9	6	31	--	35	--	1,026
Pinyon / Juniper	11	717	--	563	--	82	--	44	--	121	1,537
Ponderosa Pine	1,245	228	34	37	4	18	461	4	325	2	2,357
Redwood	3	17	--	31	38	65	379	--	219	--	753
Western White Pine	30	123	--	13	--	--	--	--	--	--	166
Other western softwoods	166	919	24	480	--	31	24	73	43	296	2,054
Total	7,136	4,157	150	2,048	116	292	3,116	122	1,544	421	19,103

Table C3: Area of Forest Land by Forest Type Group, Ownership Group, and Forest Land Status^{1,2}, California 2007 – 2016 (Christensen, 2017)

Forest type group	Ownership										
	U.S. Forest Service		Other federal		State & local government		Private corporate		Private non-corporate		All owners
	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Total
<i>Thousand Acres</i>											
Hardwoods	1,306	2,000	141	716	34	666	1,028	697	1,253	3,898	11,738
Softwoods	7,136	4,157	150	2,048	116	292	3,116	122	1,544	421	19,103
Non-stocked*	418	277	3	84	0	7	198	7	25	24	1,042
All Types	8,860	6,434	294	2,848	150	965	4,342	825	2,821	4,344	31,882

*Formerly stocked forest land that currently has less than 10% stocking, but has the potential to again become 10% stocked. For example, recently harvested, burned or windthrow-damaged areas.